

## **Remarks and Arguments**

### **The Claim Amendments**

Claims 1-3 and 5-28 are pending in this application. Claims 1, 5 and 26 have been amended, and Claims 23 - 25 have been canceled. Claims 1-3, 5-22 and 26-28 remain.

### **The Rejection Under 35 U.S.C. §103(a)**

The Examiner rejected Claims 1-28 under 35 U.S.C. §103(a) as being unpatentable over Housley et al. (US 2001/0007910) in view of Spiller et al. (U.S. Patent No. 2,962,361). Applicants respectfully traverse the Examiner's rejection.

On May 28, 2008, a telephone interview was conducted between Applicants' attorney, Applicants Frank Belmonte, Allen Mossman and David Sikkenga, and Examiner Taylor Oh. The interview was requested by Applicants for the purpose of discussing the rejection. Applicants thank the Examiner for his time and respectfully request allowance of the claims based on that discussion and the amendments, remarks and arguments contained herein. If the Examiner is of the opinion that the interview summary below is inaccurate in any way, he is respectfully requested to contact Applicants' attorney so that any correction may be addressed.

During the telephone interview, Applicants again explained how their inventive process is different from certain features disclosed in Housley et al. and Spiller et al. (and also Baldwin et al.) and why there would be no incentive for one skilled in the art to combine their teachings. These differences were also discussed in greater detail in previous Responses and Amendments, including the Amendment dated May 10, 2007, Response dated September 4, 2007, and Amendment dated April 24, 2008. At the conclusion of the telephone interview, the Examiner said that Applicants did not have to repeat these arguments again in this Amendment.

Applicants also explained to the Examiner during the telephone interview that another novel aspect of their invention not found in the prior art is introducing at least a portion of the condensed solvent from the first oxidation stage into the second oxidation stage. By sending a portion of the condensed solvent to the second oxidation stage, Applicants' process can run at a high enough catalyst concentration and obtain sufficient reactivity in the first oxidation stage to achieve desired vent oxygen levels, high product quality, and lower acetic acid burning for at least comparable reaction

conversion. The Examiner indicated that adding appropriate language regarding the condensed solvent to Claim 1 appeared to place the claims in condition for allowance, and an agreement was reached to amend Claim 1 accordingly.

At the request of Applicants' attorney, Applicants compiled the data below from Tables 1-7 of the specification to clearly and readily illustrate the advantages of introducing at least a portion of the condensed solvent from the first oxidation stage into the second oxidation stage.

Example No.	17 (Portion of condensed solvent from the first oxidation stage is introduced into the second oxidation stage)	18 (Essentially no condensed solvent from the first oxidation stage is introduced into the second oxidation stage)
Ratio of first reactor cobalt concentration/second reactor cobalt concentration	2.23	0.976
First Stage Reactor Temperature (°F)	320	321
Pressure (psig)	232	226
Residence Time (min)	101	47
Water concentration (wt. %)	7.0	6.9
Vent oxygen (mole %)	1.23	1.24
Second Stage Reactor Temperature (°F)	386	386
Pressure (psig)	222	216
Residence Time (min)	66	58
Water concentration (wt. %)	11.7	11.5
Product OD340 (Washed & Filtered)	0.334	0.402
Product 4-CBA Concentration (ppmw)	3404	3528
First + Second Reactor HAc Burning (lbs/Mlb PX)	44.2	48.5

As shown above in the table, a direct comparison is made between Example 17, wherein a substantial portion of the condensed solvent is diverted from the first oxidation stage and introduced into the second oxidation stage, and Example 18, wherein essentially no condensed solvent is diverted from the first oxidation stage and introduced into the second oxidation stage. This is evident from a comparison of the ratios of the cobalt concentrations in the first and second stage reactors due to the fact that cobalt is a good tracer for measuring changes in solvent amounts. In Example 18, the ratio is approximately 1 (0.976), indicating that little or no condensed solvent has been diverted. In Example 17, however, the cobalt ratio is 2.23, indicating that the concentration in the first stage is more than twice as much as in the second stage. This increased concentration is a direct result of less solvent in the first stage due its diversion to the second stage. The higher residence time in Example 17 (101 minutes versus 47 minutes in Example 18) also confirms the diversion of condensed solvent from the first oxidation stage to the second oxidation stage. Since less condensed solvent is going to the first stage in Example 17, the remaining solvent stays in the first stage reactor longer and the residence time is increased.

All of the important conditions (temperature, pressure, water concentration, and first stage vent oxygen concentration) are essentially the same for Examples 17 and 18, and the first stage vent oxygen concentrations are notably low for both Examples, indicating high oxygen utilization. However, in Example 17, when condensed solvent is diverted from the first stage to the second stage, additional advantages are achieved by the present invention, including better product quality and lower acetic acid (HAc) burning. As shown in the table, the OD340 level and the 4-CBA concentration (both of which are important measures of product quality and desirably have low values) were both significantly lower in Example 17.

The 4-CBA concentration is also important because 4-CBA is a reaction intermediate considered to be a good measure of reaction conversion. In Example 17, the lower 4-CBA concentration indicates that reaction conversion was greater. Additionally, when 4-CBA is lower, HAc burning is usually greater. However, as shown in the table, when the condensed solvent was diverted in Example 17, the HAc burning

was unexpectedly lower even with the lower 4-CBA concentration, thereby resulting in a very desirable high reaction conversion.

Accordingly, for all of the reasons discussed above, there would be no incentive for one skilled in the art to combine any of the prior art references of record because doing so would not result in Applicants' inventive process which introduces at least a portion of the condensed solvent from the first oxidation stage to the second oxidation stage to achieve high oxygen utilization, desired product quality, and lower acetic acid burning for at least comparable reaction conversion.

**Conclusion**

The Applicants respectfully request that the Examiner consider the foregoing arguments and amendments. Applicants submit that Claims 1-3, 5-22 and 26-28 are in condition for allowance and respectfully request allowance of these claims.

July 21, 2008

Respectfully submitted,

Customer No. 04249  
Correspondence Address:  
BP America Inc.  
Docket Clerk, BP Legal, M.C. 5 East  
4101 Winfield Road  
Warrenville, Illinois 60555

  
Kelly L. Cummings  
Attorney for the Applicants  
Registration Number 39,646  
(630) 821-2452